طرح نگهداشت و افزایش تولید 27 مخزن

HVAC CALCULATION NOTE FOR SECURITY BUILDING - BK14

نگهداشت و افزایش تولید میدان نفتی بینک

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Status:

IDC: Inter-Discipline Check
IFC: Issued For Comment
IFA: Issued For Approval
AFD: Approved For Design
AFC: Approved For Construction
AFP: Approved For Purchase
AFQ: Approved For Quotation
IFI: Issued For Information
AB-R: As-Built for CLIENT Review
AB-A: As-Built –Approved

REVISION RECORD SHEET

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1.0 INTRODUCTION

Binak oilfield in Bushehr province is a part of the southern oilfields of Iran, is located 20 km northwest of Genaveh city.

With the aim of increasing production of oil from Binak oilfield, an EPC/EPD Project has been defined by NIOC/NISOC and awarded to Petro Iran Development Company (PEDCO).Also PEDCO (as General Contractor) has assigned the EPC-packages of the Project to "Hirgan Energy - Design and Inspection" JV.

GENERAL DEFINITION

The following terms shall be used in this document.

CLIENT:	National Iranian South Oilfields Company (NISOC)
PROJECT:	Binak Oilfield Development – General Facilities
GENERAL CONTRACTOR (GC):	Petro Iran Development Company (PEDCO)
EPC CONTRACTOR:	Joint Venture of :Hirgan Energy – Design & Inspection(D&I) Companies
VENDOR:	The firm or person who will fabricate the equipment or material.
EXECUTOR:	Executor is the party which carries out all or part of construction and/or commissioning for the project.
THIRD PARTY INSPECTOR (TPI):	The firm appointed by EPD/EPC CONTRACTOR(GC) and approved by CLIENT (in writing) for the inspection of goods.
SHALL:	Is used where a provision is mandatory.
SHOULD:	Is used where a provision is advisory only.
WILL:	Is normally used in connection with the action by CLIENT rather than by an EPC/EPD CONTRACTOR, supplier or VENDOR
MAY:	Is used where a provision is completely discretionary.

2.0 SCOPE

This document covers minimum necessary requirements for basis of design and main equipment’s to be used for the Heating, Ventilating, Air-Conditioning and pressurizing and plumbing system for buildings for project

3.0 NORMATIVE REFERENCES

3.1 LOCAL CODES AND STANDARDS

- IPS — Iranian petroleum standards
- INBC — Iranian National Building Code

3.2 INTERNATIONAL CODES AND STANDARDS

- ASTM — American Society for Testing Materials Relevant Parts
- API 610 — Centrifugal Pumps for General Refinery Service, 10th Edition
- ISO 15156 — Petroleum and Natural Gas Industries. Materials for use in H2S Containing Environments in Oil and Gas Production
- AMCA — Air Movement and Control Association
- ANSI — American National Standards Institute.
- ASHRAE — American Society of Heating, Refrigeration and Air-conditioning Engineer
- ASTM — American Society for Testing and Material
- BOCA — Building Officials and Code Administrators international
- BS — British Standards
- CIBSE — Chartered Institute of Building Services Engineers.
- NFPA — National fire protection association
- SBCCI — Southern Building Code Congress International
- SMACNA — Sheet Metal and Air Conditioning Contractors' National Association
- AWWA — American Water Works Association
- ASME — The American Society of Mechanical Engineers

Note: The latest issued or revised edition of all above mentioned codes and standards shall be considered as reference.

3.3 ENVIRONMENTAL DATA

Refer to "Process Basis of Design; Doc. No BK-GNRAL-PEDCO-000-PR-DB-0001 .

4.0 HVAC CALCULATION

4.1 DESIGN WEATHER PARAMETERS:

DESIGN PARAMETERS:

City Name ..... **bink**

Location ..... **IRAN**

Latitude **30.3**
Deg.Longitude ..... **-50.2**
Deg.Elevation ..... **10.0** m
Summer Design Dry-Bulb ..... **41.0** °C
Summer Coincident Wet-Bulb ..... **30.5** °C
Summer Daily Range **15.0**
°K Winter Design Dry-Bulb ..... **6.0** °C
Winter Design Wet-Bulb ..... **6.0** °C
Atmospheric Clearness Number **1.00**
Average Ground Reflectance **0.20**

Soil Conductivity **1.385**
W/(m-°K)Local Time Zone (GMT +/- N hours) ..... **-1.0** hours
Consider Daylight Savings Time ..... **No**
Simulation Weather Data ..... **none N/A**

Current Data is ..... **User Modified**
Design Cooling Months ..... **January to December**

DESIGN DAY MAXIMUM SOLAR HEAT GAINS

(The MSHG values are expressed in W/m²)

Month	N	NNE	NE	ENE	E	ESE	SE	SSE	S
January	76.4	76.4	104.1	335.1	577.4	722.3	796.4	786.7	764.0
February	88.0	88.0	230.9	458.1	662.9	773.4	774.9	717.7	674.9
March	100.7	108.6	368.7	585.3	707.6	758.3	705.1	595.4	528.1
April	113.1	256.3	472.2	642.7	716.0	679.9	580.0	422.9	334.5
May	124.2	353.9	534.8	663.8	694.2	620.4	475.0	290.9	209.6
June	157.8	384.6	558.6	667.1	676.8	585.8	428.0	240.6	172.3
July	127.6	344.7	537.1	656.3	678.1	598.4	463.4	281.6	203.3
August	118.2	248.3	466.5	623.6	687.8	654.3	558.9	407.2	322.5
September	104.5	113.3	336.6	555.0	683.3	716.4	681.4	580.5	517.4
October	90.9	90.9	201.8	462.7	636.7	736.7	756.5	701.7	660.0
November	77.8	77.8	98.3	345.3	551.3	718.6	773.6	774.1	756.1
December	71.4	71.4	71.4	269.7	530.8	696.4	785.4	795.0	786.8
Month	**SSW**	**SW**	**WSW**	**W**	**WNW**	**NW**	**NNW**	**HOR**	**Mult**
January	789.5	796.9	721.1	569.2	354.1	83.2	76.4	579.3	1.00
February	722.0	781.4	766.3	669.5	467.5	224.5	88.0	702.0	1.00
March	596.6	704.4	761.1	720.6	569.4	368.1	116.6	809.9	1.00
April	421.4	576.3	689.2	714.5	631.4	476.0	257.9	863.7	1.00
May	289.5	470.8	624.0	691.1	655.0	542.6	355.7	877.6	1.00
June	238.3	421.9	590.9	670.1	656.4	565.4	389.3	873.7	1.00
July	278.1	456.2	609.2	671.7	644.3	540.2	353.4	863.9	1.00
August	405.5	554.8	664.2	689.2	610.9	463.3	256.0	845.0	1.00
September	580.7	681.6	714.0	684.8	554.4	333.4	114.2	785.9	1.00
October	698.5	750.4	744.7	624.3	458.7	216.5	90.9	693.3	1.00
November	770.3	775.6	718.6	559.7	335.4	103.0	77.8	579.1	1.00
December	796.5	774.3	701.4	517.9	296.9	71.4	71.4	527.6	1.00

4.2 CONSTRUCTIONS U-VALUE:

External Wall

Wall Details

Outside Surface Color ..... **Medium**
Absorptivity **0.675**
Overall U-Value ..... **0.589** W/(m²-°K)

Wall Layers Details (Inside to Outside)

Layers	Thickness mm	Density kg/m³	Specific Ht. kJ / (kg - °K)	R-Value (m²-°K)/W	Weight kg/m²
Inside surface resistance	0.000	0.0	0.00	0.12064	0.0
concrete block	250.000	2000.0	0.84	0.23750	500.0
insulation	50.000	40.0	0.92	1.19000	2.0
100mm face brick	100.000	2002.3	0.92	0.09000	200.2
Outside surface resistance	0.000	0.0	0.00	0.05864	0.0
Totals	**400.000**	**-**		**1.69678**	**702.2**

External Roof

Roof Details

Outside Surface Color ..... **Dark**
Absorptivity **0.900**
Overall U-Value ..... **0.642** W/(m²-°K)

Roof Layers Details (Inside to Outside)

Layers	Thickness mm	Density kg/m³	Specific Ht. kJ / (kg - °K)	R-Value (m²-°K)/W	Weight kg/m²
Inside surface resistance	0.000	0.0	0.00	0.12064	0.0
50mm HW concrete	50.000	2242.6	0.84	0.03000	112.1
poly styrene block	200.000	10.0	0.84	0.59000	2.0
Built-up roofing	100.000	1121.3	1.47	0.61467	112.1
terrazzo	25.000	0.0	0.84	0.14449	0.0
Outside surface resistance	0.000	0.0	0.00	0.05864	0.0
Totals	**375.000**	**-**		**1.55843**	**226.3**

DOOR (1.0 x 2.2)

Door Details:

Gross Area ..... **2.2** m²
Door U-Value ..... **4.000** W/(m²-°K)

Glass Details:

Glass Area ..... **0.0** m²
Glass U-Value ..... **3.293** W/(m²-°K)
Glass Shade Coefficient **0.880**
Glass Shaded All Day? **No**

WINDOWS

WIN1

Window Details:

Detailed Input ..... **No**
Height ..... **1.80** m
Width ..... **1.50** m
Overall U-Value ..... **3.339** W/(m²-°K)
Overall Shade Coefficient **0.500**

WIN2

Window Details:

Detailed Input ..... **No**
Height ..... **1.20** m
Width ..... **1.50** m
Overall U-Value ..... **3.339** W/(m²-°K)
Overall Shade Coefficient **0.500**

4.3 SPACE INPUT DATA:

GAURD ROOM

1. General Details:

Floor Area ..... **21.0** m²
Avg. Ceiling Height ..... **3.2** m
Building Weight ..... **341.8** kg/m²

1.1. OA Ventilation Requirements:

Space Usage ..... **User-Defined**
OA Requirement 1 ..... **0.0** L/s
OA Requirement 2 ..... **0.0** L/s
Space Usage Defaults . **ASHRAE Standard 62.1-2007**

2. Internals:

2.1. Overhead Lighting:

Fixture Type ..... **Free Hanging**
Wattage ..... **288.0** Watts
Ballast Multiplier **1.20**
Schedule ..... **Lighting**

2.2. Task Lighting:

Wattage ..... **0.00** W/m²
Schedule ..... **None**

2.3. Electrical Equipment:

Wattage ..... **200.0** Watts
Schedule ..... **Equipment**

2.4. People:

Occupancy ..... **2.0** People
Activity Level ..... **Office Work**
Sensible ..... **71.8** W/person
Latent ..... **60.1** W/person
Schedule ..... **People**

2.5. Miscellaneous Loads:

Sensible ..... **0** W
Schedule ..... **None**
Latent ..... **0** W
Schedule ..... **None**

3. Walls, Windows, Doors:

Exp.	Wall Gross Area (m²)	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
WNW	19.5	2	0	0
NNE	13.7	1	0	1
SSW	19.5	1	0	1

3.1. Construction Types for Exposure WNW

Wall Type ..... **External Wall**
1st Window Type **WIN1**
1st Window Shade Type **shade1**

3.2. Construction Types for Exposure NNE
Wall Type ..... **External Wall**
1st Window Type **WIN1**
1st Window Shade Type **shade2**
Door Type **1*2.2**

3.3. Construction Types for Exposure SSW
Wall Type ..... **External Wall**
1st Window Type **WIN1**
1st Window Shade Type **shade3**
Door Type **1*2.2**

4. Roofs, Skylights:

Exp.	Roof Gross Area (m²)	Roof Slope (deg.)	Skylight Qty.
H	21.0	0	0

4.1. Construction Types for Exposure H
Roof Type ..... **External Roof**

5. Infiltration:
Design Cooling ..... **35.00** L/s
Design Heating ..... **35.00** L/s
Energy Analysis ..... **0.00** L/s
Infiltration occurs at all hours.

6. Floors:
Type ..... **Slab Floor On Grade**
Floor Area ..... **21.0** m²
Total Floor U-Value ..... **2.000** W/(m²-°K)
Exposed Perimeter ..... **12** m
Edge Insulation R-Value ..... **0.00** (m²-°K)/W

7. Partitions:
7.1. 1st Partition Details:
Partition Type ..... **Wall Partition**
Area ..... **10.0** m²
U-Value ..... **2.839** W/(m²-°K)
Uncondit. Space Max Temp ..... **35.0** °C
Ambient at Space Max Temp ..... **41.0** °C
Uncondit. Space Min Temp ..... **14.0** °C
Ambient at Space Min Temp ..... **6.0** °C

7.2. 2ND Partition Details:

REST ROOM & PANTRY

1. General Details:
Floor Area ..... **22.0** m²
Avg. Ceiling Height ..... **3.2** m
Building Weight ..... **341.8** kg/m²

1.1. OA Ventilation Requirements:
Space Usage ..... **User-Defined**
OA Requirement 1 ..... **0.0** L/s
OA Requirement 2 ..... **0.00** L/(s-m²)
Space Usage Defaults . **ASHRAE Standard 62.1-2007**

2. Internals:
2.1. Overhead Lighting:
Fixture Type ..... **Free Hanging**
Wattage ..... **216 watts**
Ballast Multiplier **1.20**
Schedule ..... **Lighting**

2.2. Task Lighting:
Wattage ..... **0.00** W/m²
Schedule ..... **None**

2.4. People:
Occupancy ..... **1.0** Person
Activity Level ..... **Office Work**
Sensible ..... **71.8** W/person
Latent ..... **60.1** W/person
Schedule ..... **People**

2.5. Miscellaneous Loads:
Sensible ..... **480** W
Schedule ..... **Equipment**
Latent ..... **250** W

Schedule ..... **Equipment**

2.3. Electrical Equipment:

Wattage ..... **200.0** Watts
Schedule ..... **Equipment**

3. Walls, Windows, Doors:

Exp.	Wall Gross Area (m²)	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
ESE	19.5	1	0	0
NNE	17.1	1	0	0
SSW	17.1	0	0	0

3.1. Construction Types for Exposure ESE

Wall Type ..... **External Wall**
1st Window Type **WIN2**

3.2. Construction Types for Exposure NNE

Wall Type ..... **External Wall**
1st Window Type **WIN2**

3.3. Construction Types for Exposure SSW

Wall Type ..... **External Wall**

4. Roofs, Skylights:

Exp.	Roof Gross Area (m²)	Roof Slope (deg.)	Skylight Qty.
H	22.0	0	0

4.1. Construction Types for Exposure H

Roof Type ..... **External Roof**

5. Infiltration:

Design Cooling ..... **35.00** L/s
Design Heating ..... **35.00** L/s
Energy Analysis ..... **0.00** L/s
Infiltration occurs at all hours.

6. Floors:

Type ..... **Slab Floor On Grade**
Floor Area ..... **21.0** m²
Total Floor U-Value ..... **2.000** W/(m²-°K)
Exposed Perimeter ..... **13.2** m
Edge Insulation R-Value ..... **0.00** (m²-°K)/W

7. Partitions:

7.1. 1st Partition Details:

Partition Type ..... **Wall Partition**
Area ..... **7.0** m²
U-Value ..... **2.839** W/(m²-°K)
Uncondit. Space Max Temp ..... **35.0** °C
Ambient at Space Max Temp ..... **41.0** °C
Uncondit. Space Min Temp ..... **14.0** °C
Ambient at Space Min Temp ..... **6.0** °C

7.2. 2nd Partition Details:

(No partition data).

.

4.4 SYSTEM INPUT DATA:

1. General Details:

Air System Name ..... **SECURITY BUILDING OF WELL PAD 14**
Equipment Type ..... **Terminal Units**
Air System Type ..... **Split DX Fan Coil**
Number of zones **1**
Ventilation ..... **Direct Ventilation**

2. Ventilation System Components:

(Common Ventilation System not used: no inputs)

3. Zone Components:

Space Assignments:

Zone 1: Zone 1	
GAURD ROOM	x1
REST ROOM	x1

Thermostats and Zone Data:

Zone	Cooling T-Stat Occ. (°C)	Cooling T-Stat Unocc. (°C)	Heating T-Stat Occ. (°C)	Heating T-Stat Unocc. (°C)	T-Stat Throttling Range (°C)
1	24.0	24.0	22.0	22.0	0.83

Thermostat Schedule ..... **Fan**
Unoccupied Cooling is ..... **Available**

Common Terminal Unit Data:

Cooling Coil:

Design Supply Temperature ..... **14.0** °C
Coil Bypass Factor **0.100**
Cooling Source ..... **Air-Cooled DX**
Schedule ..... **JFMAMJJASOND**

Heating Coil:

Design Supply Temperature ..... **35.0** °C
Heating Source ..... **Electric Resistance**
Schedule ..... **JFMAMJJASOND**

Fan Control ..... **Fan On**
Ventilation Sizing Method ..... **Sum of Space OA Airflows**

Terminal Units Data:

Zone ..... **All**
Terminal Type ..... **Fan Coil**
Minimum Airflow ..... **0.00** L/s/person
Fan Performance ..... **1000** Pa
Fan Overall Efficiency ..... **50** %

4. Sizing Data (Computer-Generated):

System Sizing Data:

Sizing Data:

Cooling Supply Temperature ..... **14.0** °C
Heating Supply Temperature ..... **35.0** °C

Hydronic Sizing Specifications:

Chilled Water Delta-T ..... **5.6** °K
Hot Water Delta-T ..... **11.1** °K

Safety Factors:

Cooling Sensible ..... **10** %
Cooling Latent ..... **10** %
Heating ..... **10** %

Zone Sizing Data:

Zone Airflow Sizing Method ..... **Sum of space airflow rates**
Space Airflow Sizing Method ..... **Individual peak space loads**

Zone	Supply Airflow (L/s)	Zone Htg Unit (kW)	Reheat Coil (kW)	Ventilation (L/s)
1	628.4	-	-	0.0

5. Equipment Data

Terminal Cooling Units - Air-Cooled DX

Zone	Estimated Maximum Load (kW)	Design OAT (°C)	Equipment Sizing	Gross Cooling Capacity (kW)	Capacity Oversizing Factor (%)	Compressor + OD Fan Power (kW)	ARI Performance Rating	Units	Conventional Cutoff OAT (°C)
1	11.7	35.0	Auto-Sized	-	0	-	3.224	EER	-17.8

Air System Information

Air System Name **SECURITY BUILDING OF WELL PAD 14**
Equipment Class ..... **TERM**
Air System Type ..... **SPLT-FC**

Number of zones **1**
Floor Area ..... **43.0** m^2
Location ..... **binak, IRAN**

Sizing Calculation Information

Calculation Months ..... **Jan to Dec**
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**
Space L/s Sizing ..... **Individual peak space loads**

Zone Sizing Data

Zone Name	Maximum Cooling Sensible (kW)	Design Airflow (L/s)	Minimum Airflow (L/s)	Time of Peak Load	Maximum Heating Load (kW)	Zone Floor Area (m²)	Zone L/(s-m²)
Zone 1	7.6	628	628	Jul 1500	4.8	43.0	14.61

Terminal Unit Sizing Data - Cooling

Zone Name	Total Coil Load (kW)	Sens Coil Load (kW)	Coil Entering DB / WB (°C)	Coil Leaving DB / WB (°C)	Water Flow @ 5.6 °K (L/s)	Time of Peak Load
Zone 1	11.7	8.5	26.3 / 19.8	15.1 / 14.5	-	Jun 1500

Terminal Unit Sizing Data - Heating, Fan, Ventilation

Zone Name	Heating Coil Load (kW)	Heating Coil Ent/Lvg DB (°C)	Htg Coil Water Flow @11.1 °K (L/s)	Fan Design Airflow (L/s)	Fan Motor (BHP)	Fan Motor (kW)	OA Vent Design Airflow (L/s)
Zone 1	3.5	23.4 / 28.1	-	628	1.584	1.257	0

Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m²)	Space L/(s-m²)
Zone 1							
GAURD ROOM	1	4.3	Jul 1500	354	2.7	21.0	16.87
REST ROOM	1	3.3	Jul 1500	274	2.1	22.0	12.46

Ventilation Sizing Summary

1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**

2. Space Ventilation Analysis Table

Zone Name / Space Name	Mult.	Floor Area (m²)	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s-m²))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
Zone 1									
GAURD ROOM	1	21.0	2.0	354.4	0.00	0.00	0.0	0.0	0.0
REST ROOM	1	22.0	1.0	274.0	0.00	0.00	0.0	0.0	0.0
Totals (incl. Space Multipliers)				**628.4**					**0.0**

Air System Design Load Summary

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jun 1500 COOLING OA DB / WB 40.4 °C / 30.5 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 6.0 °C / 6.0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	14 m²	1097	-	14 m²	-	-
Wall Transmission	88 m²	652	-	88 m²	826	-
Roof Transmission	43 m²	613	-	43 m²	441	-
Window Transmission	14 m²	661	-	14 m²	769	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	4 m²	242	-	4 m²	282	-
Floor Transmission	42 m²	0	-	42 m²	307	-
Partitions	17 m²	437	-	17 m²	386	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	605 W	605	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	400 W	400	-	0	0	-
People	3	215	180	0	0	0
Infiltration	-	1388	2468	-	1350	0
Miscellaneous	-	480	250	-	0	0
Safety Factor	10% / 10%	679	290	10%	436	0
>> Total Zone Loads	**-**	**7470**	**3188**	**-**	**4798**	**0**
Zone Conditioning	-	7262	3188	-	4797	0
Plenum Wall Load	0%	0	-	0	0	-
Plenum Roof Load	0%	0	-	0	0	-
Plenum Lighting Load	0%	0	-	0	0	-
Exhaust Fan Load	0 L/s	0	-	0 L/s	0	-
Ventilation Load	0 L/s	0	0	0 L/s	0	0
Ventilation Fan Load	0 L/s	0	-	0 L/s	0	-
Space Fan Coil Fans	-	1257	-	-	-1257	-
Duct Heat Gain / Loss	0%	0	-	0%	0	-
>> Total System Loads	**-**	**8519**	**3188**	**-**	**3540**	**0**
Terminal Unit Cooling	-	8519	3208	-	0	0
Terminal Unit Heating	-	0	-	-	3540	-
>> Total Conditioning	**-**	**8519**	**3208**	**-**	**3540**	**0**
Key:	**Positive values are clg loads Negative values are htg loads**			**Positive values are htg loads Negative values are clg loads**		

Zone Design Load Summary

Zone 1	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 1500 COOLING OA DB / WB 41.0 °C / 30.5 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 6.0 °C / 6.0 °C		
	OCCUPIED T-STAT 24.0 °C			OCCUPIED T-STAT 22.0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	14 m²	1069	-	14 m²	-	-
Wall Transmission	88 m²	679	-	88 m²	826	-
Roof Transmission	43 m²	612	-	43 m²	441	-
Window Transmission	14 m²	688	-	14 m²	769	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	4 m²	252	-	4 m²	282	-
Floor Transmission	42 m²	0	-	42 m²	307	-
Partitions	17 m²	453	-	17 m²	386	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	605 W	605	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	400 W	400	-	0	0	-
People	3	215	180	0	0	0
Infiltration	-	1435	2390	-	1350	0
Miscellaneous	-	480	250	-	0	0
Safety Factor	10% / 10%	689	282	10%	436	0
>> Total Zone Loads	**-**	**7577**	**3102**	**-**	**4798**	**0**

Space Design Load Summary

TABLE 1.1.A. COMPONENT LOADS FOR SPACE " GAURD ROOM " IN ZONE " Zone 1 "						
	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 1500 COOLING OA DB / WB 41.0 °C / 30.5 °C OCCUPIED T-STAT 24.0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 6.0 °C / 6.0 °C OCCUPIED T-STAT 22.0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	**Details**	**(W)**	**(W)**	**Details**	**(W)**	**(W)**
Window & Skylight Solar Loads	11 m²	859	-	11 m²	-	-
Wall Transmission	38 m²	285	-	38 m²	354	-
Roof Transmission	21 m²	299	-	21 m²	216	-
Window Transmission	11 m²	516	-	11 m²	577	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	4 m²	252	-	4 m²	282	-
Floor Transmission	21 m²	0	-	21 m²	150	-
Partitions	10 m²	267	-	10 m²	227	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	346 W	346	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	200 W	200	-	0	0	-
People	2	144	120	0	0	0
Infiltration	-	717	1195	-	675	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 10%	388	132	10%	248	0
>> Total Zone Loads	**-**	**4273**	**1447**	**-**	**2728**	**0**

TABLE 1.1.B. ENVELOPE LOADS FOR SPACE " GAURD ROOM " IN ZONE " Zone 1 "						
				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m²-°K))	Coeff.	(W)	(W)	(W)
WNW EXPOSURE						
WALL	14	0.589	-	116	-	133
WINDOW 1	5	3.339	0.500	258	643	288
NNE EXPOSURE						
WALL	9	0.589	-	65	-	83
WINDOW 1	3	3.339	0.500	129	110	144
DOOR	2	4.000	-	126	-	141
SSW EXPOSURE						
WALL	15	0.589	-	104	-	138
WINDOW 1	3	3.339	0.500	129	105	144
DOOR	2	4.000	-	126	-	141
H EXPOSURE						
ROOF	21	0.642	-	299	-	216

TABLE 1.2.A. COMPONENT LOADS FOR SPACE " REST ROOM " IN ZONE " Zone 1 "						
	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 1500 COOLING OA DB / WB 41.0 °C / 30.5 °C OCCUPIED T-STAT 24.0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 6.0 °C / 6.0 °C OCCUPIED T-STAT 22.0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	**Details**	**(W)**	**(W)**	**Details**	**(W)**	**(W)**
Window & Skylight Solar Loads	4 m²	210	-	4 m²	-	-
Wall Transmission	50 m²	394	-	50 m²	472	-
Roof Transmission	22 m²	313	-	22 m²	226	-
Window Transmission	4 m²	172	-	4 m²	192	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	21 m²	0	-	21 m²	157	-
Partitions	7 m²	187	-	7 m²	159	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	259 W	259	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	200 W	200	-	0	0	-
People	1	72	60	0	0	0
Infiltration	-	717	1195	-	675	0
Miscellaneous	-	480	250	-	0	0
Safety Factor	10% / 10%	300	151	10%	188	0
>> Total Zone Loads	**-**	**3304**	**1656**	**-**	**2070**	**0**

TABLE 1.2.B. ENVELOPE LOADS FOR SPACE " REST ROOM " IN ZONE " Zone 1 "						
				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m²-°K))	Coeff.	(W)	(W)	(W)
ESE EXPOSURE						
WALL	18	0.589	-	159	-	167
WINDOW 1	2	3.339	0.500	86	129	96
NNE EXPOSURE						
WALL	15	0.589	-	112	-	144
WINDOW 1	2	3.339	0.500	86	81	96
SSW EXPOSURE						
WALL	17	0.589	-	122	-	161
H EXPOSURE						
ROOF	22	0.642	-	313	-	226

5.0 Equipment Selection

5.1 AIR CONDITIONING UNIT

- **Guard Room** Total Cooling Load= 5720 w

Actual Total Cooling Load with considering 10% over capacity = 6292 w ≈ 21468 btu/hr
Actual Total heating Load with considering 10% over capacity = 2728 * 1.1 *3.412=10238 btu/hr

Split Unit Actual Cooling/Heating Capacity= 21468 / 10238 btu/hr

Guard Room load ÷ Quantity = 21468 btu/hr ÷ 1 = 21468 btu/hr→ 1*split unit 24000 nominal load-wall mounted (Tropical-heat pump type)

(nominal capacity will be checked by vendor according to ambient temperature)

Indoor Unit Equipment No: 1301-BK-14-SUI-01

Quantity: 1

Type : wall mounted

Outdoor Unit Equipment No: 1301-BK14-SUO-01

- **Rest Room & Pantry** Total Cooling Load= 4960 w

Actual Total Cooling Load with considering 10% over capacity = 5456 w ≈ 18615 btu/hr
Actual Total heating Load with considering 10% over capacity = 2070 * 1.1 *3.412=7769 btu/hr

Split Unit Actual Cooling/Heating Capacity= 18615 / 7769 btu/hr

Guard Room load ÷ Quantity = 18615 btu/hr ÷ 1 = 18615 btu/hr→ 1*split unit 24000 nominal load-wall mounted (Tropical-heat pump type)

(nominal capacity will be checked by vendor according to ambient temperature)

Indoor Unit Equipment No: 1301-BK-14-SUI-02

Quantity: 1

Type : wall mounted

Outdoor Unit Equipment No: 1301-BK14-SUO-02

5.2 EXHAUST FAN SELECTION

Equipment No:	1301-BK14-EF-01	1301-BK14-EF-02
Quantity	1	1
Type	AXIAL(PIPE MOUNTED)	Wall Mounted
Flow Rate(litr/s)	35	35
Static Pressure	Pvc pipe:15 pa	15 pa
Service Area	Toilet (Indoor)	Toilet
Remarks		